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# *Botryobasidium sassofratinoense* sp. nov. (*Cantharellales, Basidiomycota*) from Italy

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**Abstract** — *Botryobasidium sassofratinoense* is described as new cystidiate species from Riserva of Sasso Fratino, located in Emilia-Romagna Region in the northern part of Italy. A key to the cystidiate species of *Botryobasidium* is provided and the new species is compared with the most closely related species, *B. ansosum* and *B. pilosellum*.

**Key words** — taxonomy, wood-inhabiting fungi, *Abies alba*, Europe

## Introduction

During the revision of material present in HUBO herbarium, a nameless specimen fell into the hands of one of the authors (A.B.), and on its envelope was written: "This could be a nice species!" After a close look the collection turned out to represent a cystidiate *Botryobasidium* close to *B. ansosum* (H.S. Jacks. & D.P. Rogers) Parmasto and to *B. pilosellum* J. Erikss. but with some different microscopic characters. It seemed quite surprising to discover a new species in a reserve that had been so well investigated during the last 25 years (with 545 macrofungi recorded from that area; Bernicchia & Gorjón 2009), and where two other new species had been described so recently: *Fomitopsis labyrinthica* Bernicchia & Ryvarden (Bernicchia & Ryvarden 1996) and *Ceriporiopsis guidella* Bernicchia & Ryvarden (Bernicchia & Ryvarden 2003). What is even more intriguing is that all three new species were recorded along the same trail that goes from Pian del Pero to Rio Cullacce inside Sasso Fratino Natural Reserve.

The genus *Botryobasidium* Donk belongs to the fungal order *Cantharellales* (*Homobasidiomycetes*) and about 50 species are recognized (CBS 2009, Langer 1994, Parmasto et al. 2004). *Botryobasidium* is a saprobic genus with corticioid to hypochnoid resupinate basidiocarps and diagnostic basidia that are short, cylindrical or subcylindrical to suburniform with 2–8 sterigmata, and generally arranged in clusters. *Botryobasidium* shows clear relations with *Thanatephorus*, *Ceratobasidium,* and *Cejpomyces,* in which basidiospores generally grow by repetition; it is also related to *Sistotrema,* which differs in the nature of the hymenium (palisade in *Sistotrema* and clustered in *Botryobasidium*) and shape of basidia (urniform in *Sistotrema* and subcylindrical to suburniform in *Botryobasidium*). Molecular data have confirmed these relationships, placing *Botryobasidium* in the cantharelloid clade as a sister taxon of *Sistotrema, Cantharellus*, *Craterellus*, *Hydnum,* and *Clavulina* (Moncalvo et al. 2006).

## Material and methods

For light microscopic studies, samples were mounted in 3% potassium hydroxide (KOH) and Melzer's solution (IKI). Thirty basidiospores have been measured to calculate the mean length and width and the following abbreviations are used: L* = mean spore length, W* = mean spore width, Q* = quotient of the spore length and width (L*/W*). Specimens are deposited in HUBO.

## Species description

***Botryobasidium sassofratinoense*** Bernicchia & G. Langer, **sp. nov.** Figs. 1,2

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*Carposomata annua, resupinata, tenuissima, effusa, levia vel hypochnoidea, subalbida vel cremeo-alba. Systema hypharum monomiticum: hyphae generativae erectae, hyalinae, fibulatae angulo recto ramosae; tenuitunicate 5–8(–9) µm latae in subhymenio, leviter crassitunicatae, 10–12(–15) µm latae in subicolo. Cystidia rara, subcylindracea, pleraque tenuiter tunicata, 28–45(–55) µm longa et 5–7 µm lata. Basidia subcylindracea vel suburniformia, leviter constricta, cum fibula basali, (13–)18–25 µm longa et 6–8.5 µm lata, 6-sterigmatibus recurvis. Basidiosporae hyalinae, tenuiter tunicatae, leves, navicularum figura, saepe quaternibus se congregatae, (6–)7–8.5 µm longae, (3–)3.5–4.5 µm latae, inamyloideae.*

***Holotypus**: Italia, Forlí-Cesena, Riserva Integrale di Sasso Fratino, loc. Rio Cullacce, 950 m. leg. A. Bernicchia 27.09.2001, in ligno putrido Abies alba, coll. 7594 in herbario HUBO conservatus est. Isotypus in K.*

Etymology: the specific epithet derives from the name of the collecting area, Riserva di Sasso Fratino.

Description — basidiomata annual, resupinate, effuse, very thin, smooth to arachnoid, whitish to pale ivory, 150–200 µm thick, margin indistinct and not differentiated. hyphal system monomitic: generative hyphae clamped and smooth, thin-walled, branched at right angles, 5–8(–9) µm wide in

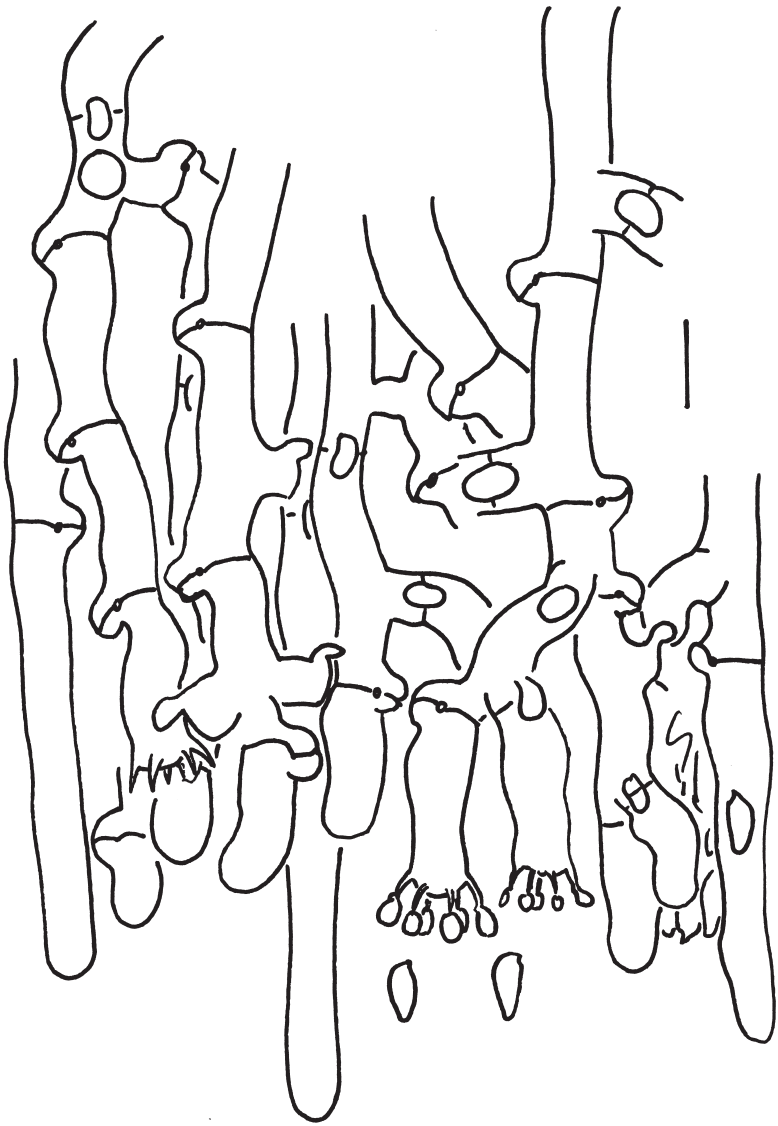

Fig. 1. *Botryobasidium sassofratinoense* (coll. A. Bernicchia 7594)
Hymenial elements. Bar=10 μm

Fig. 2. *Botryobasidium sassofratinoense* (coll. A. Bernicchia 7594)
Basidia and basidiospores. Bar=10 µm above, 5 µm below

subhymenium, slightly thick-walled in subiculum, 10–12(–15) µm wide and slightly yellowish near to the substrate. CYSTIDIA tubular, not frequent, basally clamped, hyaline, smooth, thin-walled, apically obtuse, 28–45(–55) × 5–7 µm, without additional septa (Figure 1). BASIDIA arranged in botryose clusters, suburniform to subcylindrical, slightly constricted, smooth, thin-walled, basally clamped, (13–)18–25 × 6–8.5 µm, usually with 6 slender sterigmata up to 2.5-3.5(–4) µm long (Figure 2). BASIDIOSPORES navicular (Figure 2), hyaline, smooth, thin-walled, mostly glued together in groups of four, IKI–, (6–)7–8.5 × (3–)3.5–4.5 µm, with apiculus bent towards ventral side, L* = 7.7, W* = 3.9, Q* = 1.97. Chlamydospores and anamorph not found.

Distribution and Ecology — Thus far *Botryobasidium sassofratinoense* is known only from the type locality growing on well-decayed *Abies alba* wood. The area is a 764.25 ha Natural Reserve located in the northern Apennines (43°49'59"N, 11°49'E). It has a humid oceanic to subcontinental bioclimate (Gonnelli & Bottacci 2009), where *Fagus sylvatica* is the dominant species with well preserved areas of *Abies alba, Acer pseudoplatanus, Ulmus glabra, Fraxinus excelsior, Taxus baccata, Quercus cerris, Q. petraea, Ostrya carpinifolia, Carpinus betulus,* and *Corylus avellana* the most significant.

Remarks — *Botryobasidium sassofratinoense* belongs to the group of cystidiate and clamped *Botryobasidium* species. Of these, *B. baicalinum* Kotir. & Ryvarden and *B. parvisetosum* Boidin & Gilles produce subglobose chlamydospores and very long, two-celled cystidia (Boidin & Gilles 1998, Kotiranta & Ryvarden 2007). *Botryobasidium grandinioides* Hallenb. has a grandinioid to aculeate basidiome with longer, densely encrusted cystidia. *Botryobasidium ansosum* is distinguished by longer, wider cystidia and basidiospores, and *B. pilosellum* has shorter basidiospores and longer encrusted cystidia. Moreover, the former two species and *B. sassofratinoense* also differ from *B. grandinioides* in the hypochnoid to arachnoid hymenophore. Table 1 compares some diagnostic characters of related species and *B. sassofratinoense*.

**Key for the cystidiate species of *Botryobasidium***

1a. With chlamydospores, two-celled cystidia ..... 2
1b. Without chlamydospores, cystidia different ..... 3
2a. Cystidia 50–90 µm long, basidiospores 7.2–9.2 × 2.2–3 µm ..... *B. parvisetosum*
2b. Cystidia > 100 µm long, basidiospores 7–8 × 2.7–3.4 µm ..... *B. baicalinum*
3a. Hyphae with clamps ..... 4
3b. Hyphae without clamps ..... 7
4a. Basidiome grandinioid to aculeate ..... *B. grandinioides*
4b. Basidiome smooth or hypochnoid to arachnoid ..... 5
5a. Hyphae/cystidia with incrustation, basidiospores (4.5–)5–6 × 2.5–3 µm ..... *B. pilosellum*
5b. Hyphae/cystidia without incrustation, basidiospores (6–)7–10 × (3–)3.5–5 µm .. 6
6a. Cystidia 50–120 × 8–12 µm, basidiospores 8–10 × 4–5 µm ..... *B. ansosum*
6b. Cystidia 28–45(–55) × 5–7 µm, basidiospores (6–)7–8.5 × (3–)3.5–4.5 µm ..... *B. sassofratinoense*
7a. Basidia 8–13 × 5–6 µm, basidiospores 4.5–7 × 2–3 µm ..... *B. piliferum*
7b. Basidia and basidiospores larger ..... 8
8a. Basidia 17–22 × 9–10.5 µm, basidiospores 10–11.5 × 4–5.5 µm ..... *B. digitatum*
8b. Basidia 15–18(–20) × 6–8 µm, basidiospores 7.5–8.5 × 3–4 µm .... *B. tubulicystidium*

Table 1. Comparison of related *Botryobasidium* species with *B. sassofratinoense* (all measures in µm).

| Species | Clamps | Cystidia | Basidia | Basidio-spores | Hymenophore | Encrustation | Distribution | Substrate |
|---|---|---|---|---|---|---|---|---|
| *ansosum* | constant | 50–120 × 8–12 | 17–29 × 7–10 | 8–9(–10) × 4–5 | hypochnoid to pilosa | none | North America | conifer wood, especially *Pinus, Picea* |
| *digitatum* | absent | 60–125 × 6–9 | 17–22 × 9–10.5 | 10–11.5 × 4–5.5 | pruinose to arachnoid | none | Panama | wood (burned) |
| *grandinioides* | constant | up to 200 × 9–10 | 15–16(–19) × 5.5–7 | 6–7(–9) × 3–4 | hypochnoid to grandinioid | strong | Iran | wood |
| *piliferum* | absent | 40–100 × 6–8 | (8–)9–13 × 5–6 | 4.5–7 × 2–3 | arachnoid to hypochnoid | none | Africa | wood |
| *pilosellum* | constant | 65–100 × 4–9 | 15–20 × 5–6.5 | (4.5–)5–6 × 2.5–3 | hypochnoid | slight | Ukraine | conifer wood |
| ***sassofratinoense*** | constant | 28–45(–55) × 5–7 | (13–)18–25 × 6–8.5 | (6–)7–8.5 × (3–)3.5–4.5 | smooth to hypochnoid | none | Italy | conifer wood, *Abies alba* |
| *tubulicystidium* | absent | 60–110 × 6–9 | 15–18(–20) × 6–8 | 7.5–8.5 × 3–4 | arachnoid | none | Taiwan | wood |

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